OHoC
371.3358
E24t

Educational Television Series 1968-69

Teachers' Guide

DEPT. OF EDUCATION
HISTORICAL COLLECTION

Mathematics-Science

Primary Division

Educational Television Branch
ONTARIO DEPARTMENT OF EDUCATION
1670 Bayview Avenue, Toronto 17

MATHEMATICS–SCIENCE

9 programs of 15 minutes each for primary students.

General Introduction

SHAPES IN NATURE

Program one
Journey into Nature 2

Program two
What Did We See? 3

Program three
Using Shapes 3

FAMILIAR THINGS IN THE KITCHEN

Program four
Popcorn 4

Program five
Drops 4

Program six
Jelly 5

SEEDS AND GROWTH

Introduction to Seeds and Growth 5

Program seven
The Importance of Plants and Seeds 5

Program eight
The Growth of Seeds 6

Program nine
The Uses of Seeds 6

GENERAL INTRODUCTION

This series is presented in three sections, each consisting of three programs.

Shapes in Nature is concerned with the resemblance of many natural and man-made objects to basic geometric figures.

Familiar Things in the Kitchen presents some experiments using well known materials; in these programs the emphasis is on the *method* of learning.

Seeds and Growth explores the miracle of seed germination and plant growth.

It is not intended that the programs be used as a kind of visual textbook. No attempt is made to present a large body of facts, and there is no exploration in depth of any concept or understanding. The presentations are intended rather as a stimulus for further activity on the part of the children. We will see children active in a variety of ways; observing and recording, measuring, experimenting, making collections, comparing, and discussing common problems. In short, the discovery-activity approach to learning stressed. It is expected that the children, with the help of the teacher, will be stimulated to further inquiry. Considerable thought should be given, therefore, to the classroom activities which will follow the telecast.

It is a major purpose of the series that children be helped to discover for themselves the relationship between the sciences and mathematics. The programs in these presentations emphasize the dependence of science upon mathematics, and they show also the debt owed by mathematics to the natural world.

Although designed for the primary division, generally, the first group are beamed particularly at the second year level, the second group at the first year level and the third group at the third year level. Curriculum P1, J1, Interim Revision Science.

The ETV Branch is anxious to hear from teachers concerning the experimental aspects of these programs. Are children interested in seeing other children on the TV screen? How do children viewing the programs respond to situations placed in classroom settings? Is there value in a program which is planned so that children are free to follow their own lines of activity and speech? Should children be put in front of a camera without having previously memorized speeches and actions? To what extent are these programs successful in encouraging children to try for themselves? Are programs of this nature useful in the development of *your* curriculum?

Comments on these programs will be of great value in determining lines to be followed on future programs. Please send them to the ETV Branch, 1670 Bayview Avenue, Toronto 17, Ontario.

Suggested Reading:

1. *Interim Revision Science* (P_1J_1): Preamble, Introduction and "Observing Familiar Things". pp. 1-6.
2. *Interim Revision Science:* Appendix B, Case History in the Nuffield Science Project, pp. 22-28.
3. *Kindergarten:* Activity Time, pp. 17-21.

SHAPES IN NATURE

PROGRAM 1

JOURNEY INTO NATURE

This program is designed to stimulate the children's interest in nature and to emphasize the beauty and wonder of fundamental geometric forms.

PROGRAM CONTENT

A class of grade 2 children is seen disembarking from a bus. We are told by the narrator that this class has come to the countryside to look for things which have interesting patterns and shapes.

The children spread out in the fields, along the river bank, and in the woodlot. The camera follows them, individually and in groups, as they discover and examine various objects. There is no narration in this program, the viewing class being left to make their own discoveries.

In sequence we see the following:

- wild flowers
- dandelion heads
- poplar trees
- turtle eggs
- butterflies
- mushrooms
- acorns
- inch worms
- fungus growth
- fern leaves
- flower petals
- a wasp's nest
- a log
- stones and pebbles
- a moving fish in the water, and a girl sketching the fish.

Each of these objects represents a common geometrical shape, but no attempt is made during the program to draw attention to this fact.

At the end of the telecast, the children board the bus for the return journey to the school.

SUGGESTED PRE-VIEWING ACTIVITIES

These should be brief. Tell the class that they are going to join a group of children on a field trip to the country. For consideration during the program, these questions might be asked:

- What things do you think we might see on the trip?
- Could we make a list of interesting things we see as the program proceeds?

SUGGESTED POST-VIEWING ACTIVITIES

1. A discussion of the program
   - What did the children on the screen see?
   - Compare our list with what we saw.
   - The children could be asked to draw some of the things seen on the screen. The class could then, as a group, identify the basic shapes of these things. The log, for instance, would be identified as a cylinder.
2. The children could be asked to bring from their homes, or from the surrounding area, other objects with interesting shapes. These objects could then be classified in sets (e.g. a set of circular objects).
3. If it is possible a field trip similar to the one seen on the television program could be organized.
4. A number of creative activities might be undertaken. For example:
   a. Physical Education – children might be asked to make various shapes with their bodies.
   b. Mathematics/Science – have children bring natural objects – e.g. a butterfly – and identify the geometric figures found with it.
   c. Art – cut the various shapes freehand and use them to create pictures, animals, etc.
   d. English – write stories about the animals in b. and c. above.

PROGRAM 2

WHAT DID WE SEE

To work with the natural shapes in creative activities to gain familiarity with their variety, and to obtain knowledge of the basic geometric forms.

PROGRAM CONTENT

Mrs. Bisbee's class has brought to the classroom a number of objects (plants, rock, and animals) and in this program the children engage in a variety of activities designed to help them learn more about the shapes of these objects.

Brief sequences from the first program are used to relate the discovery of the natural object to the classroom activity connected with it.

We see children examining a terrarium and then attempting to discover the geometric shapes represented in the body of a toad. The little girl sketching a swimming fish in the first program is now seen making a painting of it. Children are seen also in picture-making activities – one boy draws the poplar trees, a girl is drawing flowers. A group of children is seen modelling the natural shapes, while another group is engaged in mounting some of the objects collected.

At various times during the program we observe children using basic geometric shapes (made from pipe cleaners) in an attempt to classify the objects in groups of similar shapes.

SUGGESTED PRE-VIEWING ACTIVITIES

1. Classes who have seen the first program, and have carried out activities as a result of that program, might review briefly what they have done and learned. The teacher can then suggest that it will be interesting to observe what the children in Mrs. Bisbee's class have done. So the children will be comparing activities.
2. For other classes a brief lesson might be useful. The children might be encouraged to bring things with interesting shapes to school (e.g., rocks, flowers, small animals and insects, fungus growths, logs, etc.). Time could be spent examining these shapes, assembling them in collections of similar shapes, trying to find shapes already known (e.g., triangles, squares, circles, etc.).

SUGGESTED POST-VIEWING ACTIVITIES

1. Some teachers may wish to give some of the shapes their formal geometric names at this point.
2. Children could engage in some of the activities seen in the program.
3. The children could make models of the formal geometric shapes – triangles, squares, rectangles, cubes, prisms, circles, spheres, etc. – using construction paper, clay or plasticene.

PROGRAM 3

USING SHAPES

The purpose of this program is to introduce the language of shapes and to show how man uses geometric shapes for his own purposes.

PROGRAM CONTENT

The program begins with a random series of shots, various natural forms which illustrate the shapes studied in the preceding programs. From these, the precise geometric forms are developed and similarities made obvious. We are then introduced to the language of shapes.

A series of pictures is then shown to demonstrate that in our homes many shapes are found which have been designed by people for their own uses. The uses of man-made geometric shapes beyond the home—in industry, in recreation, in transportation, etc. – are then illustrated.

The program concludes with a brief test; its main purpose is to involve the children in the teaching-learning situation.

SUGGESTED PRE-VIEWING ACTIVITIES

1. The children will require a pencil and a piece of paper of page-size (about 8½" x 11"). It should be divided into eight equal sections and numbered.
2. The children might make models of the geometric shapes if they have not already done so.
3. The teacher could invite the children to bring things with interesting patterns and shapes from home – things that have been made by man. They could be matched with the various geometric shapes.
4. If this is the first program in the series to be viewed by the class, some of the activities described in the previous notes could be carried on. As an immediate prelude to viewing this program the teacher could say, "Today we are going to learn something new about shapes. And near the end of the program you will get a chance to play a little game."

SUGGESTED POST-VIEWING ACTIVITIES

1. The class can collect pictures which illustrate interesting geometric shapes and make a display. The pictures could be arranged in groups of similar shapes.
2. The teacher could arrange activities to continue the learning of the geometric terms which may be new to the children.
3. The children could put together various geometric shapes to make abstract pictures or designs. Or, using pipe cleaners, they could make mobiles using these shapes.

FAMILIAR THINGS IN THE KITCHEN

PROGRAM 4

POPCORN

The purpose of this program is to encourage children to discover the changes which occur when popcorn is popped.

PROGRAM CONTENT

"Elfie", a puppet, is shown buying popcorn from a street vendor. Later four children, Mirko, Alan, Mary, Margaret, and "Elfie" make popcorn using long-handled poppers and electric hot-plates. The children discuss briefly the appearance and the feel of the unpopped kernels. Some attempt is made to measure definite amounts of corn into the poppers. While the corn is popping, the children comment on what they see and hear. Although the puppet tries several times to have the children discuss the difference between popped and unpopped corn, their main concern at this point is to prepare the popcorn for eating. Accordingly, butter and salt are added and the children sample the popped corn.

SUGGESTED PRE-VIEWING ACTIVITIES

1. Hold a general class discussion on popcorn.
2. Examine the kernels of popping corn, using the senses of touch, sight, taste, and smell.
3. Discuss various ways of measuring the corn, ranging from a handful to definite units of measure.

SUGGESTED POST-VIEWING

1. Compare popped and unpopped corn with particular reference to the differences in volume.
2. Through discussion, encourage the children to pursue their own investigations. Some of the children may become interested in finding out whether other foods or materials act the same way when heated. Some may develop an interest in smells. Some may become interested in sounds and the various ways they may be produced. Some may want to observe a popcorn vending machine closely and find out how it works. Some may wish to build a store to sell popcorn while last, but not least, the children will probably want to share the experience of eating popcorn with their classmates.

PROGRAM 5

DROPS

The purpose of this program is to encourage children to discover for themselves that the shapes which drops make on a paper are different because, of the distance the drops must fall, the position, and the type of paper which was used.

PROGRAM CONTENT

The program opens by showing raindrops on a window-pane, drops from a lawn sprinkler, and from a tap.

Viewers then see children in a classroom freely experimenting by using coloured water drops from eye droppers and small brushes on various kinds of paper – newsprint, kleenex tissue, blotting paper, and waxed paper—and watching what happens to them. Later in the program, a basin of sand is also used. The children try dropping the drops from various heights—from sitting and standing positions on the floor, and standing on chairs – and on level and inclined planes. Many of the comments the children made as they experimented with the drops cannot be heard clearly. However, it is anticipated that the children who are viewing the program will make their own comments as they watch. No attempt has been made to come to any conclusions.

At the end of the program, some of the children are shown recording things which they each found interesting or significant.

SUGGESTED PRE-VIEWING ACTIVITIES

1. Have the children experiment with water to discover its properties.
2. Discuss the many kinds of drops in the the world the child knows.

SUGGESTED POST-VIEWING ACTIVITIES

1. Compare sizes of drops which are dropped from different heights.
2. Compare drops on different kinds of paper.
3. Such comparisons may lead in some cases to simple graphs.
4. Use other liquids for producing drops.
5. Talk about the shapes of the drops and the designs produced by them. This may interest some children and encourage them to continue their experimentations along artistic lines.
6. Have some children experiment with

the effect of drops on soil, and in telling the rest of the class about their discoveries.

7. Find other ways of making drops, such as those from a dripping faucet.

PROGRAM 6

JELLY

The purpose of this program is to encourage children to observe the changes which take place after some fluid materials are poured into moulds.

PROGRAM CONTENT

The four children, Mary, Margaret, Alan, and Mirko, along with "Elfie", the puppet, examine briefly the gelatin granules under a magnifying glass before they actually make the jelly. They use a simple chart to help them with the directions. After the material has been poured into individual moulds and put into the refrigerator, the children watch two short films. Both show how materials can become fluid in nature, then solid again. The first film shows concrete being poured into rectangular moulds, then the moulds are removed when the concrete has hardened. The other film shows plastic being forced through tubes and the finished product, waste baskets.

After the film, the four children and "Elfie" discuss how long it takes for jelly to harden. Jelly, prepared previously, is given to the children to cut and eat.

SUGGESTED PRE-VIEWING ACTIVITIES

1. Let the children talk about the materials needed in the making of jelly. They may wish to bring packages of jelly powder. If so, the children may group the packages of jelly into sets according to colour or flavour.
2. If the children bring various moulds and containers, these may lead to a discussion of shapes and sizes.
3. Comparison of sizes could lead the children to find various ways of measuring the containers – e.g. by height, by circumference, by diameter, by weight, etc.

SUGGESTED POST-VIEWING ACTIVITIES

1. Have the children make jelly. Although the jelly in the program was taken out of the moulds beforehand, the children might like to do this with the help of the teacher in the classroom.
2. Have the children compare the shapes of the unmoulded jelly and the containers from which they were taken.
3. Class discussion and projects may develop along many lines, including:
   - some shapes in the world around the children,
   - the feel of jelly to the touch,
   - the question of whether jelly is a liquid or a solid,
   - the way in which jelly can be cut evenly into halves and quarters. This may lead to an interest in the symmetry of objects.
4. Encourage the children to talk about concrete and plastics.

SEEDS AND GROWTH

INTRODUCTION

This section of the Mathematics-Science series consists of three programs based upon the unit "Seed Growth" recommended for the pupils of the third year (see P1, J1, Interim Science). Although these programs are directed at the upper primary division, they can be applicable at the kindergarten, first and second year levels.

The prime objectives of the series are:

- to help develop the ability to predict and verify over a period of time;
- to provide experience in interpreting mathematical symbols in a practical and realistic situation;
- to gain through the study of seeds a knowledge of how plants grow;
- to realize the basic needs of plant growth;
- to provide an opportunity for pupil involvement not only through the study of seeds, but also through the mathematical activities which follow as a result of this study.

The first two programs of the series follow one class as it divides into groups to study seeds and seed growth. The children in the classroom are unrehearsed and their activities stem from their own interest. The third program takes us out of the classroom so that a study can be made of the importance of seeds and their value to us.

It is hoped that Program 1 will motivate the children who are viewing the programs to plant seeds of their own so that they will be able to compare what they did with the television class.

PROGRAM 7

THE IMPORTANCE OF PLANTS AND SEEDS

The purpose of this program is to stimulate the interest of the children in examining and planting seeds.

PROGRAM CONTENT

A class of Grade 3 children, pupils of Miss Donna Gowans, Norwood Park School, Hamilton, are seen in small groups in the classroom examining and planting seeds. At various times during the program one child at each activity centre is asked to describe what his group is doing. In sequence we will see the following activities:

- children looking at a variety of seeds and noting their similarities and differences,
- children sorting and classifying seeds as to colour and size,
- children counting and measuring seeds,
- children weighing the seeds,
- children painting and making creative designs with seeds,
- children filling containers with soil and planting the seeds,
- children labelling the various containers.

At the end of the program, some of the children are shown recording what each found interesting or significant.

SUGGESTED PRE-VIEWING ACTIVITIES

The children could be given a variety of seeds before the telecast so that they can sort and classify their seeds. Then viewing children will be able to compare what they have done with the television class.

SUGGESTED POST-VIEWING ACTIVITIES

1. A discussion of the program:
   - what did children on the screen do with their seeds?
   - did the television class do anything that was new or different?
2. In preparation for the children planting seeds:
   - Make a collection of various types of containers (e.g. pots, wooden boxes, plastic cups, glass jars) for planting.
   - If the children have not already brought seeds to school, have them select a committee to go to the local store to buy seeds. Prior to this, the class could discuss such things as the types and sizes of seeds to buy, and the length of germination.
   - Have the children fill their containers with soil. This should give them interesting practice in estimating and comparing volumes of different shaped containers.
3. Prior to actually planting the seeds, review the activities of the television class in planting their seeds.

PROGRAM 8

THE GROWTH OF SEEDS

The purpose of this program is to show how children can observe, measure and compare the growth stages of seedlings.

PROGRAM CONTENT

In this program, we see the seeds that the children planted in Program 1 at various stages of growth. The television children carry out the following activities:

- digging up some of the seedlings and comparing their rate of growth,
- measuring the roots, stems and leaves of the various plants,
- mounting the seedlings on large sheets of paper,
- painting and drawing the various seedlings,
- making graphs.

During the program, several children will be asked to describe the activity in which they are engaged.

SUGGESTED PRE-VIEWING ACTIVITIES

1. After seeing the first program, classes who have planted their own seeds might review briefly what they have done and learned. The children can then compare the growth of their own seedlings with those of the television class.
2. For other classes, it might be useful to have a brief discussion on what the television class has already done and what you think they might do with their seedlings in this program.

SUGGESTED POST-VIEWING ACTIVITIES

1. The children could engage in some of the activities seen in the program.
2. A brief discussion on which plants grew the best and the reasons for this (e.g. amount of water and soil, temperature, sunlight) would be valuable in pointing out the needs of seed growth.
3. The children might give an oral or written report on their own activities.
4. The children might wish to plant seeds around the school in order to add beauty to their surroundings.
5. The children might find it both interesting and worthwhile to make a visit to a farm during seeding.

PROGRAM 9

THE USES OF SEEDS

The purpose of the program is to make the children more aware of the importance of seeds in fulfilling the needs of man and animals.

PROGRAM CONTENT

Through the use of film footage, the children will see how man has made use of seeds to provide food, fibre, shelter, fuel, recreation and beauty. For each of the above, only one or two examples will be given. It is hoped, by viewing the program, that the children will be motivated into further research and enquiry of their own.

SUGGESTED PRE-VIEWING ACTIVITIES

In preparation for the program, there could be a brief discussion as to the value and uses of seeds to man and animal. The children could then list their ideas and perhaps add to it during the telecast.

SUGGESTED POST-VIEWING ACTIVITIES

1. Plan a visit to a greenhouse to see how seeds give rise to new plants.
2. Further research could be done on how seeds help us.
3. A field trip to a stream would enable children to see how trees and undergrowth prevent erosion.
4. Suggest that the children collect pictures showing how seeds help us.
5. Have the children bring samples of wood, cloth, and fruit which come from seeds.
6. Continue measuring and comparing their seedlings and graphing the results.

MATHEMATICS – SCIENCE – Primary Division
9 programs, 15 minutes each in three sections

Prog. No.	CBC	CBLT	CHCH	CKCO	CBOT	CKLW
1	OCT. 18 – 9:50-10:05 OCT. 21 – 10:00-10:15		OCT. 22 – 9:50-10:05	OCT. 17 – 10:15-10:30	OCT. 25 – 9:40-9:55	OCT. 24 – 10:45-11:00
2	OCT. 25 – 9:50-10:05 OCT. 28 – 10:05-10:20		OCT. 29 – 9:50-10:05	OCT. 24 – 10:15-10:30	NOV. 1 – 10:15-10:30	OCT. 31 – 10:45-11:00
3	NOV. 1 – 9:50-10:05 NOV. 4 – 10:05-10:20		NOV. 5 – 9:50-10:05	OCT. 31 – 10:15-10:30	NOV. 8 – 10:15-10:30	NOV. 7 – 10:45-11:00
4	JAN. 8 – 10:15-10:30 JAN. 29 – 10:15-10:30	FEB. 14 – 10:15-10:30 FEB. 21 – 10:15-10:30	JAN. 10 – 9:10-9:25 FEB. 28 – 9:10-9:25		JAN. 17 – 10:15-10:30	
5	JAN. 15 – 9:55-10:10 FEB. 5 – 10:10-10:25	FEB. 28 – 10:15-10:30	JAN. 17 – 9:10-9:25		JAN. 24 – 10:15-10:30	
6	JAN. 22 – 9:55-10:10		JAN. 24 – 9:10-9:25 MAR. 14 – 9:10-9:25		JAN. 31 – 10:15-10:30	
7	MAR. 26 – 10:05-10:20 APR. 2 – 10:05-10:20		MAR. 28 – 9:30-9:45		APR. 18 – 10:05-10:20	
8	APR. 9 – 9:50-10:05 APR. 16 – 10:15-10:30		APR. 11 – 9:30-9:45		APR. 25 – 10:15-10:30	
9	APR. 23 – 10:15-10:30 APR. 30 – 10:15-10:30		APR. 21 – 9:10-9:25		MAY 2 – 10:10-10:25	

MATHEMATICS - SCIENCE